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The comparison of effectiveness of aerobic exercise and aerobic exercise with kinesio taping treatments in fibromyalgia syndrome

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Abstract

Aim: The aim of this study is to determine the effectiveness of aerobic exercise and aerobic exercise with kinesio taping treatment approaches in patients with Fibromyalgia Syndrome (FM) as well as to evaluate the superiority of these treatment approaches overto each other.

Material and Methods: Forty patients diagnosed with FM according to the American College of Rheumatology (ACR) 1990 criteria for the classification of FM were included in this study and the patients were randomly divided into two equal groups. Aerobic exercise program was performed for 8 weeks in the first group and aerobic exercise program for 8 weeks with 15-day kinesio taping treatment was performed in the second group.

Results: When the superiority of the two treatment approaches to each other was compared, aerobic exercise with kinesio taping treatment was more effective than only aerobic exercise treatment in reducing the severity of pain ($p<0,001$), fatigue ($p<0,05$) and sleep disturbance ($p<0,05$), improving the physical functioning ($p<0,05$) and improving the physical functioning and bodily pain ($p<0,05$) subscales of Short Form-36 (SF-36).

Discussion: Results of the study suggested that aerobic exercises are an effective treatment method on reducing the symptoms and level of depression, improving the physical functioning and quality of life in patients with FM and the kinesio taping method provides a significant benefit in these patients. Further studies are needed to determine the effectiveness of kinesio taping in the treatment of FM.

Keywords
Fibromyalgia, Aerobic Exercise, Treatment

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Introduction

Fibromyalgia syndrome (FM) is a clinical syndrome with an unclear etiology characterized by chronic generalized body pain, fatigue, sleep disorder, multiple somatic and cognitive problems [1].

The prevalence of FM in the overall population was reported to be 2.7%. FM is more often seen in women than men and the female/male ratio is 3:1 [2]. The risk factors for FM include female gender, advanced age, family history, low education and income level, and rheumatological diseases. On the other side, the distribution of childhood FM between genders is equal. The patients are mostly diagnosed between 30-60 years of age. Its prevalence increases with age, and the most dramatic increase occurs between 5th-6th decades [3,4]. The disease onset in children is usually between 11-15 years of age. It has been also reported in the population studies that FM develops more frequently in subjects with low education and socioeconomic level [5].

Many studies have demonstrated that exercise is beneficial in patients with FM [6-8]. There is strong evidence that aerobic exercises are effective in reducing pain, the number of tender points and depression levels and improving life quality [9,10]. Therefore, aerobic exercises are accepted as one of the most important treatment methods in patients with FM. Walking, swimming, cycling, dancing and aquatic (in water) exercises can be given as examples of primary aerobic exercises recommended for the treatment of FM. It has been noted in the studies that aerobic exercise performed at 60%-70% of the maximum heart rate for 20-30 minutes in 2-3 days weekly is the most effective treatment program for reducing the symptoms [11,12]. Aerobic exercise workout should start with a warming-up period and end with a cooling-down period. Warming-up and cooling-down periods take 5-10 minutes.

Kinesio taping is a special taping technique developed by Kenzo Kase, a Japanese specialist chiropractor and acupuncturist, in 1973 and has been used in our country in recent years. The standard tapes limit the joint movements, decelerate the healing process of the damaged tissue due to compressive effect in some cases and do not support deep tissues such as fascia. Dr. Kase developed kinesio tape as a result of 2-year research starting at the beginning of the 1970s based on the idea that more successful treatment outcomes can be obtained using a taping method similar to structural features and flexibility of the human skin without limitation of the joint movements. Kinesio taping practice is a supportive treatment method implemented combined with other treatment methods in orthopedic injuries, muscular injuries due to excessive effort and muscular fatigue, sportive injuries, neurological and rheumatological diseases, lymphedema and all kinds of painful conditions. The major contraindications of kinesio taping include allergy to polyacrylate adhesives, active cellulitis or skin infection in the application site, open wound, malignancy and deep vein thrombosis. It should be used carefully in cases of diabetes mellitus, kidney disease, congestive heart failure, coronary artery disease, skin sensitivity and pregnancy. It has been noted that the pain-reducing effect of the band is sourced from its increasing blood and lymph circulation by enlarging the space between skin and muscle, particularly through its lifting effect [13]. The main advantages of kinesio taping are non-invasiveness, simplicity, low cost, easy removability by the patient if necessary, and the absence of serious side effects. However, there is a limited number of evidence-based studies addressing the effects of kinesio taping application in the tender points of the patients with FM.

In our present study, we investigated the effectiveness of aerobic exercise alone and together with kinesio taping as treatment approaches in reducing symptoms and depression levels, as well as increasing physical functions and life quality in patients with FM, besides, we evaluated the superiority between these treatment approaches.

Material and Methods

The study was approved by the Ethics Committee of Ataturk University, Medical Faculty (Date: 2011-05-13, No: 05/02) and was conducted as a prospective, randomized and single-centered study between June 2011 and February 2013 in the Department of Physical Medicine and Rehabilitation, Ataturk University Medical Faculty. The study included 40 patients who met the inclusion criteria (18-60 years of age, diagnosis of FM according to the 1990 ACR FM classification criteria, sedentary lifestyle, signing the informed consent form). The exclusion criteria were allergic skin disease, having a cardiovascular, pulmonary, orthopedic or neurological disease inhibiting exercising, malignant tumoral disease, mental or psychotic disease, pregnancy.

The 40 patients who met the inclusion criteria of the study were numbered according to admission order and randomized into two groups. In the first group, only aerobic exercise group was applied for 8 weeks, while in the second group, aerobic exercise group for 8 weeks together with kinesio taping treatment program was applied for 15 days. The patients were evaluated by filling the Visual Analogue Scale (VAS-pain, VAS-fatigue, VAS-morning stiffness, VAS-sleep problem), Fibromyalgia Impact Questionnaire (FIQ), Beck Depression Inventory (BDI) and Short Form-36 (SF-36) and counting the tender points.

In the first group, assigned as the aerobic exercise group, a program of moderate-intensity aerobic walking exercise was applied for 3 days per week for 8 weeks for 20, 30 and 40 minutes during the first 2, between 3-5 weeks and during the last 3 weeks, respectively. The first and last stages of each exercise program were set as warming-up and cooling-down periods. In the second group, assigned as kinesio taping group together with aerobic exercise, the same aerobic exercise with an addition of kinesio taping treatment on the tender points was applied for the last 15 days. Muscle taping technique was used as the taping technique. Inhibition was implemented on the muscles with tender points and taping treatment was usually performed with 15%-25% stretch tension, while paper-off tension was used in some of the taping applications, and usually Y-strip was preferred, while some applications were performed using X-strip. The tapes were replaced once every 3-5 days according to the condition of the patient (sweating, skin structure, friction status). Thereby, the bands were assured to stay on the patients for 15 days.

SPSS v21 software was used for statistical analysis of the study data. The comparison between the demographic characteristics

of the groups was carried out using the Mann-Whitney U (MWU) test and the Chi-Square test. Chi-Square and Fisher's Exact Test were applied to compare the baseline symptoms and findings between the groups. The Wilcoxon Signed Rank Test (WSRT) and MWU test were preferred for the intragroup and intergroup comparisons of the baseline VAS values, FIQ, SF-36 and BDI scores, respectively. The statistical significance level was accepted as p<0.05 and two-tailed probability.

Ethical Approval

Ethics Committee approval for the study was obtained.

Results

All 40 patients included in the research were female and mean age of the patients was 35.23±10.26 years. Regarding baseline assessments, VAS-Pain, VAS-Morning Stiffness, VAS-Sleep problem, the number of tender points, FIQ, SF-36 and BDI scores were found to be homogeneous between groups, whereas only VAS-Fatigue scores were not homogeneous.

Aerobic exercise applied in the patients with FM was found to be effective in reducing the severity of pain, fatigue and morning stiffness (p<0.001), decreasing sleep problem (p<0.01) and the number of tender points (p<0.001), recovery of physical dysfunction (p<0.001), elevation of the life quality (p<0.05) and lowering depression level (p<0.001) as the treatment approach (Table 1). Similarly with application of aerobic exercise, kinesio taping technique administered together with aerobic exercise was detected to be effective in reducing the severity of pain, fatigue and morning stiffness (p<0.001), decreasing sleep problem and the number of tender points (p<0.001), recovery of physical dysfunction (p<0.001), elevation of the life quality (p<0.01) and lowering depression level (p<0.001) as the treatment approach (Table 2). The analysis of our study results regarding the superiority between two treatment approaches revealed that kinesio taping applied together with aerobic exercise was more effective in reducing pain (p<0.001), fatigue (p<0.05) and sleep problem (p<0.05), in recovery of physical dysfunction (p<0.05) and improving the subscale scores of physical condition and body pain in SF-36 survey (p<0.05) than the treatment of aerobic exercise alone (Table 3).

Table 1. Intra-Group Comparison of the Mean Values of the Difference Between Pre-Treatment and Post-Treatment Evaluation Scores in the Aerobic Exercise Group

Mean (SD)	T1	T2	WSRT	
			z	p
VAS-Pain	7,10 (2,08)	5,40 (2,37)	-3,789	<0,001***
VAS-Fatigue	7,30 (2,08)	5,90 (2,22)	-3,58	<0,001***
VAS-Morning Stiffness	6,85 (2,93)	4,75 (2,83)	-3,773	<0,001***
VAS-Sleep Problem	4,35 (3,75)	2,95 (3,41)	-2,732	0,006**
Tender Points	16,00 (1,65)	10,65 (3,51)	-3,934	<0,001***
FIQ	61,20 (14,98)	43,20 (18,97)	-3,922	<0,001***
SF-36 (Physical Functioning)	52,75 (19,90)	61,75(19,42)	-2,613	0,009**
SF-36 (Role Physical)	16,25 (28,42)	37,50 (42,54)	-2,648	0,008**
SF-36 (Bodily Pain)	27,70 (16,35)	42,35 (17,97)	-3,526	<0,001***
SF-36 (General Health)	30,60 (17,12)	38,15 (17,85)	-2,176	0,030*
SF-36 (Vitality)	29,25 (19,01)	43,50 (23,06)	-3,215	0,001**
SF-36 (Social Functioning)	58,13 (25,74)	76,25 (22,91)	-3,028	0,002**
SF-36 (Role Emotional)	36,66 (41,75)	63,33 (44,46)	-2,455	0,014*
SF-36 (Mental Health)	46,20 (21,81)	58,20 (21,85)	-2,857	0,004**
BDI	23,05 (14,50)	15,30 (12,93)	-3,828	<0,001***

VAS: Visual Analogue Scale, FIQ: Fibromyalgia Impact Questionnaire, SF-36: Short Form-36, BDI: Beck Depression Inventory, WSRT: Wilcoxon Sign Rank Test, SD: Standard Deviation, T1: Pre-Treatment, T2: Post-Treatment,
† p>0,05 *, p<0,05, ** p<0,01, *** p<0,001, %95 Confidence Interval, α = 0,05.

Table 2. Intra-Group Comparison of Mean Values of the Difference Between Pre-Treatment and Post-Treatment Evaluation Scores in the Kinesio Taping Group with Aerobic Exercise

Mean (SD)	T1	T2	WSRT	
			z	p
VAS-Pain	8,25 (1,65)	4,75 (2,20)	-3,945	<0,001***
VAS-Fatigue	8,80 (1,44)	5,25(2,75)	-3,637	<0,001***
VAS-Morning Stiffness	7,80 (2,19)	4,75 (2,94)	-3,735	<0,001***
VAS-Sleep Problem	5,55 (3,98)	2,70 (2,96)	-3,314	0,001**
Tender Points	16,20 (1,88)	10,15 (2,35)	-3,935	<0,001***
FIQ	69,75 (10,59)	42,85 (15,66)	-3,923	<0,001***
SF-36 (Physical Functioning)	46,75 (12,80)	59,50 (12,34)	-3,745	<0,001***
SF-36 (Role Physical)	12,50 (27,51)	48,75 (39,30)	-2,992	0,003**
SF-36 (Bodily Pain)	22,30 (11,25)	44,20 (12,19)	-3,829	<0,001***
SF-36 (General Health)	31,75 (14,98)	42,80 (18,26)	-2,737	0,006**
SF-36 (Vitality)	22,25 (15,00)	43,75 (16,45)	-3,635	<0,001***
SF-36 (Social Functioning)	50,00 (33,69)	70,00 (27,92)	-2,825	0,005**
SF-36 (Role Emotional)	36,66 (35,71)	61,66 (42,27)	-2,714	0,007**
SF-36 (Mental Health)	50,60 (22,75)	60,40 (17,88)	-2,688	0,007**
BDI	21,47 (10,47)	11,00 (9,21)	-3,926	<0,001***

VAS: Visual Analogue Scale, FIQ: Fibromyalgia Impact Questionnaire, SF-36: Short Form-36, BDI: Beck Depression Inventory, WSRT: Wilcoxon Sign Rank Test, SD: Standard Deviation, T1: Pre-Treatment, T2: Post-Treatment
† p>0,05 *, p<0,05, ** p<0,01, *** p<0,001, %95 Confidence Interval, α = 0,05.

Table 3. Comparison of the Mean Values of the Difference Between Pre-Treatment and Post-Treatment Evaluation Scores Between Treatment Groups

Mean (SD)	AEG	KTG	MWU	
			z	p
VAS-Pain	1,70 (1,34)	3,50 (1,88)	-3,492	<0,001***
VAS-Fatigue	1,40 (1,10)	3,55 (2,82)	-2,564	0,010*
VAS-Morning Stiffness	2,10 (1,48)	3,05 (2,28)	-1,216	0,224†
VAS-Sleep Problem	2,10 (1,48)	3,05 (2,28)	-1,216	0,042*
Tender Points	2,10 (1,48)	3,05 (2,28)	-1,585	0,113†
FIQ	18,00 (11,79)	26,90 (12,17)	-1,585	0,017*
SF-36 (Physical Functioning)	46,75 (12,80)	59,50 (12,34)	3,745	<0,001***
SF-36 (Role Physical)	21,25 (33,71)	36,25 (36,70)	-2,992	0,003**
SF-36 (Bodily Pain)	14,65 (14,81)	21,90 (11,96)	-3,829	<0,001***
SF-36 (General Health)	7,55 (13,70)	11,05 (15,48)	-2,737	0,006**
SF-36 (Vitality)	14,25 (16,16)	21,50 (15,74)	-3,635	<0,001***
SF-36 (Social Functioning)	18,13 (21,26)	20,00 (21,26)	-2,825	0,005**
SF-36 (Role Emotional)	26,67 (41,33)	25,00 (32,23)	-2,714	0,007**
SF-36 (Mental Health)	12,00 (6,96)	9,80 (21,07)	-2,688	0,007**
BDI	7,75 (6,96)	8,00 (7,27)	0,041	0,968†

VAS: Visual Analogue Scale, AEG: Aerobic Exercise Group, KTG: Aerobic Exercise with Kinesio Taping Group, FIQ: Fibromyalgia Impact Questionnaire, SF-36: Short Form-36, BDI: Beck Depression Inventory, MWU: Mann-Whitney U Test, SD: Standard Deviation
† p>0,05 * p<0,05, *** p<0,001, %95 Confidence Interval, α = 0,05.

Discussion

Patients with FM are mostly females and the diagnosis is usually diagnosed between 30-60 years of age, and the prevalence of the disease increases with age. The mean age of our patients was 35.23±10.26 years, and this age group is the most common age interval for FM according to the literature [3-4].

While aerobic exercises, strengthening and stretching-relaxing exercises, Tai-Chi, Qigong and Yoga are applied for the treatment of FM, we preferred aerobic exercises in our study considering their strongest evidence regarding efficacy in the treatment [10,14,15]. However, there are also studies, which showed no significant difference between aerobic and other types of exercises [16,17]. The literature review showed that the duration of aerobic exercises ranges between 5 and 32 weeks in the studies conducted on aerobic exercises for the treatment of FM, whereas, it was most commonly found to be applied for 8-16 weeks. For these reasons, we applied a program of aerobic walking exercise for 8 weeks scheduled as 20, 30 and 40 minutes during first 2, between 3-5 weeks and during last 3 weeks, respectively.

In the literature, there are only a limited number of studies carried out with kinesio taping for the treatment of FM. It was considered that kinesio taping plays its role in pain-relieving by providing analgesic effect through activation of gate control mechanism and descendant inhibitory mechanisms via sensorial stimuli and regulation of superficial and deep fascia functions, therefore kinesio taping was used in the similar painful conditions. We preferred treatment program of kinesio taping in our study considering the fact that kinesio taping can be used also for the treatment because of its pain-relieving effect. We decided to apply kinesio taping together with aerobic exercise because it is a newly tried treatment method in the treatment of FM.

It has been observed in the literature review of many studies similar to our study that aerobic exercises were effective in reducing the severity of pain, fatigue, morning stiffness and sleep problems, recovery of functional dysfunction, elevation of life quality and lowering depression level [9,10,15-18].

There are some studies in the literature, which have researched the efficacy of particularly aerobic walking exercises in the treatment of FM similar to our study. Holtgrefe et al. have reported in their study on the patients with FM that aerobic walking exercises provided a significant improvement in FIQ score, similar to our study [19]. Kayo et al. have noted in their 28-week study comparing aerobic walking exercises with stretching exercises that aerobic walking exercises yielded significant improvement in VAS-Pain, FIQ and all SF-36 subscales similar to our study [15].

Some studies were encountered in our literature review, which showed that aerobic exercises were not effective on some parameters in contrast to our study. Munguía-Izquierdo and Legaz-Arrese have applied aquatic exercises once weekly for 16 weeks in the aquatic exercise group and compared the results with control group. Although, a significant improvement was observed in the aquatic exercise group in terms of pain and number of tender points, no superiority of aquatic exercise group over the control group could be demonstrated [19]. Harden et al. have implemented a 30-minute daily aerobic home exercise program for 12 weeks and reported that aerobic exercises provided no significant improvement in VAS-Pain and depression scores [20]. Salek et al. applied aerobic exercises for 16 weeks in addition to the use of tricyclic antidepressants and analgesics, and compared the results with the group that used only tricyclic antidepressants and analgesics. A significant improvement was monitored in both groups in terms of pain scores and the number of tender points, however, no significant difference could be shown between the groups and therefore they stated that aerobic exercises yielded no additional contribution in FM [21]. Redondo et al. compared aerobic exercises with cognitive behavioral therapy after application for 8 weeks, although they monitored significant improvement in the aerobic exercise regarding FIQ and body pain subscale of SF-36 survey, they observed no improvement in BDI and also they detected no significant difference between two treatment groups [22].

There are a limited number of studies on the use of kinesio taping in FM. Vayvay et al. in their study compared laser and kinesio taping treatments used in patients with FM and encountered that kinesio taping treatment applied together with exercise provided significant improvement in the scores of nocturnal pain, FIQ and BID, whereas no significant improvement could be determined in SF-36 score [23]. Espí-López et al. showed that implementation of kinesio taping significantly decreased pain levels in the head, neck and shoulder regions of the individuals with FM and improved patient comfort [24]. Toprak Çelenay et al. have compared the efficacies of stabilization exercises implemented alone and together with kinesio taping treatments in the patients with FM, they have reported in their study that kinesio taping treatment provided significant improvement in the scores of VAS-Pain, VAS-Fatigue, FIQ, Nottingham Health Profile (NHP), BDI and Jenkins Sleep Scale (JSS) and was significantly superior to application of the stabilization exercise alone in terms of VAS-Pain, VAS-Fatigue, stiffness, decreasing the number of lost work days as well as increasing the number of the days with good feeling and elevating energy level [25]. In our literature review, we have encountered no similar study, which researched whether kinesio taping treatment provided any benefit in the treatment of FM by analyzing the superiority of aerobic exercise together with kinesio taping treatment to the application of aerobic exercise alone.

Conclusion

The results of our study showed that aerobic exercise is an effective therapeutic method in the treatment of FM and that kinesio taping therapy provides a remarkable improvement, however, further studies are needed to determine the efficacy of kinesio taping therapy in the treatment of FM. New studies with more cases and longer follow-up periods are recommended. Our study is important with respect to showing the impact of kinesion taping therapy on the treatment outcomes in FM and guiding further studies on this subject in the future.

Scientific Responsibility Statement

The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.

Animal and human rights statement
All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. No animal or human studies were carried out by the authors for this article.

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Conflict of interest
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